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Lorin L. Dame.

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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LORIN LOW DAME.

F. S. Collins.

(With Portrait.)

Lorin Low Dame, the son of Samuel and Mary Anne (Gilman) Dame, was born in Newmarket, New Hampshire, March 12, 1838. His father was a descendant of Samuel Dame, who settled in Dover about 1630; Governors Simon Bradstreet and Thomas Dudley of Massachusetts were ancestors of his mother. In 1846 the family removed to Lowell, Massachusetts, and Lorin completed the full course of the public schools, fitting for college at the High School, entering Tufts College in 1856, and graduating at the head of his class in 1860. In the same year he became principal of the High School at Braintree, Massachusetts, where he taught two years, and then resigned the position to begin the study of law. In 1863 he was married to Miss Isabel Arnold of Braintree, and in the same year he was commissioned Second Lieutenant in the Fifteenth Massachusetts Battery. He saw active service in the Gulf States and in Tennessee, was promoted to First Lieutenant, and mustered out in August, 1865; the same year he became principal of the Lexington High School, a position which he held for three years. He was principal of the Nantucket High School for two years, of the Stoneham High School for six years, and in 1876 was chosen principal of the Medford High School, the position which he held for the rest of his life. The high standard of efficiency the school has attained during his administration and its remarkable equipment, both from the material and from the aesthetic point of view, are due very largely to his judgment and taste, and to the complete confidence felt in him by his pupils and graduates, and indeed, by all with

whom he came in contact. His death, January 27, 1903, without suffering and with no previous impairment of his abilities, was what he would have chosen for himself, could he have made the choice. Mrs. Dame and four daughters survive him.

Every boy has the collecting spirit, at one time or another, and in Mr. Dame's case it first took the form of insect collecting; but even in his school days at Lowell he did some collecting of plants, and botany then soon superseded entomology. Even in his roughest campaigning in the south, he would notice the trees and flowers, and mention them in his letters home. At Lexington he began to collect with a definite intention of becoming familiar with the plants of the region: then the Nantucket flora, with its many peculiar forms in a limited area, especially attracted him, and thereafter botany was his one especial interest, outside of his family and his professional relations.

I first met him at a meeting of the Middlesex Field Club, formed for promoting interest in the botany of the county; we were together in many field excursions, and in 1882 we undertook the preparation of a county flora, which was published in 1888 under the auspices of the Middlesex Institute, the successor of the Field Club. Practically all our spare time for these six years was devoted to this work, and I learned to appreciate thoroughly his many noble and lovable characteristics. Intellectually, thoroughness was perhaps his strongest feature; no amount of time or work was too much to give to get the facts; nothing was allowed to go into the "copy" until every possible question had been answered. Naturally, we had from various quarters lists of species that would be very interesting additions to our local flora, but unless good evidence could be brought forward for them, he was inexorable, and they remained in the file known to us as the "rogues' gallery." Occasionally some new evidence would transfer a plant to the accepted list, but the number of the incorrigible finally bore quite a large proportion to the number included in the printed work. During the preparation of this work he took especial charge of the trees, and from that time, while not losing his interest in general botany, he made the trees a specialty.

I was not associated with him in his later publications, but I know that the same care, patience and judgment were used in the folio volume, Typical Elms and other Trees of Massachusetts, and in the Handbook of the Trees of New England, both of which he prepared

in connection with Henry Brooks; the same was the case with smaller papers, chiefly on botanical or historical subjects, published in magazines; the history of the Middlesex Canal published in the Bay State Monthly, Nov., 1884, is a model of a clear, accurate, readable monograph.

He was an excellent classical scholar, and had a good knowledge of modern languages; a fine mathematician, and well read in the best literature. Though exacting in his requirements in regard to the work either of himself or of others, he had always a kindly spirit towards the worker; indeed, one cannot think of him as having an unkindly thought even to those of whose aims and methods he disapproved.

With the exception of observations during trips to Nova Scotia in 1900 and Newfoundland in 1902, his botanical work was done in New England; a visit to Europe in 1880, mostly on foot through England and Scotland, was for recreation, not for science, but his journal shows that he was always noticing the flowers and trees with whose names he was familiar, but which he had never seen growing wild. It is doubtful if any one else was as well acquainted as he with our New England trees, as they grow uncultivated; and the many summers he spent at Nantucket had made him familiar with its curiously rich flora, with very limited stations for the rarer species; probably no one else knew them as well as he did.

For nine years he was trustee of Tufts College; in 1866 he received from the College the degree of Master of Arts, and in 1902 of Doctor of Science; he was a member of the Phi Beta Kappa and Zeta Psi societies; a member of the Boston Society of Natural History, the Medford Historical Society, and an original member of the New England Botanical Club.

Though at first sight his manner seemed somewhat reserved, he had warm friends in many and widely separated quarters, and his loss will be felt in all. President Capen's address in the Tuftonian and the memorial notice by the Massachusetts Schoolmasters' Club are tributes of deep personal feeling as well as of professional appreciation; the Nantucket fishermen will miss one who was always a welcome companion on a cruise; a host of his pupils will cherish his memory; all will miss an honest, modest, able, lovable man.

THE PLANT-FORMATIONS OF EASTERN MASSACHUSETTS.

J. W. BLANKINSHIP.

THIS paper is the result of studies on the eastern coast of Massachusetts and includes in general the region from Cape Ann to Plymouth and from Cape Cod to some 15 miles west of Boston. In the north this region is mainly broken and hilly, but southward spreads out into extensive sandy plains. It is bounded on the east by the sea with its extensive salt marshes and there are innumerable ponds and slow-flowing streams which support a characteristic vegetation, while the Blue Hills some 600 feet high are the most prominent landmark. Almost the whole region is sparsely wooded (about half with conifers), and much of it is covered with glacial drift. The numerous hills have usually their tops and upper slopes well denuded of soil and sparse of vegetation, and these hilltop barrens often support characteristic species. The bogs of the North here approach their southern limits and bring with them their own northern species. Withal, this debatable ground between the Carolinian and Canadian regions — often misnamed the Transitional Zone, possessing a flora made up of the mingling of the species of two very different regions and rich with intergrading forms, is one well worthy of study from the ecological as well as the systematic standpoint and these brief notes are offered more as an aid to others interested in its ecology than as a study complete in itself.

The range or area over which a given species may be naturally distributed is determined by latitude, altitude, humidity and geographical barriers, which serve to group species into "floras," each occupying an essentially distinct biological area. In each of these biological regions the flora comprises a number of segregated groups of plants occupying different areas called "habitats," each composed of essentially different species adapted to this particular combination of physical, chemical and biological conditions. The efficient factors of these plant-habitats are the chemical nature of the soil with its physical condition, the amount of contained water, the relative amount of sunlight and the effect of biological agents, somewhat modified by variation in temperature, exposure and proportion of humus present in the soil. The total aggregation of species usually

found occupying a given habitat is called a "plant-formation" from its analogy to geological formations.

There is often a considerable difference in the prevailing plant-formations of adjacent districts within the same biological region, due to difference in physiography and in the underlying rock formations, upon which the nature of the soil depends. In the district here considered the limestone areas with their characteristic plant-formations appear to be wholly absent, while more inland the saline formations are wanting. Another important element in the study of the ecology of a region is the variation in altitude above sea-level. The variation here scarcely exceeds 600 feet and may be left out of consideration, but in more mountainous districts this altitudinal variation is often sufficient to affect materially the distribution of species, which tend to group themselves at the different altitudes into zones corresponding in large part to the larger latitudinal zones of the continent, each having its own system of species and plant-formations.

In every district there is usually some dominant plant-formation, throughout which the other formations occur as lines and patches, without materially affecting the general physiognomy of the region, determined by the flora of this dominant formation, which is here the upland forest composed of the Sand Plain and Hilly Upland Formations, dependent upon the nature of the soil.

The classification followed differs in several important particulars from those usually given and is based (1) upon the soil, (2) the amount of contained moisture and (3) upon the relative amount of sunlight, which by their several combinations form the plant-habitats of this region, to which must be added the three biological formations dependent upon other factors. The table below represents the possible combinations of these factors with the resulting plant-formations as they appear in our flora.

Table of Habital Factors.

(The numbers refer to the synopsis of Plant formations following.)

Soil			silicious	argillaceous	calcareous	saline (*Halophytes*)
Humidity slight	*Xerophytes* or Arid Plants	In sunlight	(1)	(2)	....	(*m*)
		In shade	....	....	....	....
Humidity medium	*Mesophytes* or Upland Plants	In sunlight	(*n*)	(*o*)	....	....
		In shade	(3)	(4)	....	....
Humidity great	*Hygrophytes* or Lowland Plants	In sunlight	(5)	(6)	....	(7)
		In shade	(8)	(8)	....	....
Saturated or nearly so	*Helophytes.* or Swamp Plants	In sunlight	(9*a* & 9*b*)	(9*a* & 9*b*)	....	(10)
		In shade	(11)	(11)	....	....
Submersed	*Hydrophytes* or Aquatic Plants	rooted	(12)	(13)	....	(14)
		floating	(15)	(15)	....	(16)

Special Adaptations: Dependent upon human habitation (17)
" " " cultivation. (18)
Saprophytic or parasitic on other organisms. (19)

It is probable that there are other plant-formations besides those here given. There may be found a limestone formation with its characteristic species to parallel the silicious, argillaceous and saline series given. A sea-cliff formation (m) may occur northward along the coast, as a number of peculiar species are found at Nahant and Cape Ann in such situations. There may be a district flora characteristic of "dry open places" (n), (o), or of the upland thickets intermediate between (1–2) and (3–4), but, if so, it certainly is not very pronounced. In this classification, I have endeavored to give only those plant-formations which stand out with clearness and are easily segregated by their flora, recognizing the fact that they all intergrade with each other and that many species are common to a series having the same soil or the same relative amount of humidity, while others, like weeds, pay little regard to any of these conditions.

The species here italicized as "characteristic" of each formation are those usually found here only in the given formation and occurring rarely elsewhere; the other species listed are common in the formation but not at all confined to it. By far the greater part of the flora

appears to fall into this latter class of *generalized species*, though the list of characteristic species may be largely extended.

It is only by thus dividing the flora of a district into its component plant-formations and recognized habitats that any system can be introduced into the present unscientific method of quoting specific habitats and any studies attempted on specific variation based upon the influence of environment.

The local plant-formations may best take their names from the habitats of which they are characteristic and hence in the district here considered we have the following:

SYNOPSIS OF THE PLANT-FORMATIONS OF EASTERN MASSACHUSETTS.

I. Soil humidity slight. *Xerophytes* or Arid Plants.
(Little or no forest vegetation and hence no shade.)

A. Soil silicious . . . . . 1. SAND-BARREN FORMATION.
B. Soil argillaceous . . . . . 2. HILLTOP-BARREN FORMATION.

II. Soil humidity medium. *Mesophytes* or Upland Plants.
(These uplands forested and consequently mainly shade vegetation.)

A. Soil silicious . . . . 3. SAND-PLAIN FOREST FORMATION.
B. Soil argillaceous . . . 4. HILLY UPLAND-FOREST FORMATION.

III. Soil humidity great. *Hygrophytes* or Lowland Plants.
a. In full sunlight.

A. Soil silicious . . . . 5. SAND-POND MARGIN FORMATION.
B. Soil argillaceous . . . . . 6. LOW-MEADOW FORMATION.
C. Soil saline (Halophytes) . . . . 7. SEA-SHORE FORMATION.

b. In the shade.

A & B. Soil silicious or argillaceous with abundant humus.
8. LOW-WOODLAND FORMATION.

IV. Soil saturated. *Helophytes* or Swamp Plants.
a. In full sunlight.

A & B. Soil silicious or argillaceous.
with little or no Sphagnum . 9a. SWAMP FORMATION.
with much Sphagnum . . 9b. BOG FORMATION.
C. Soil saline (*Halophytes*) . . . . 10. SALT-MARSH FORMATION.

b. In deep shade.

A & B. Soil silicious or argillaceous 11. BOGGY-WOODLAND FORMATION.

V. Soil submersed. *Hydrophytes* or Aquatic Plants.
(All necessarily in full sunlight.)
a. Plants fixed.

A. Substratum sandy . . . . . 12. SAND-POND FORMATION.
B. Substratum argillaceous . . . . 13. MUD-POND FORMATION.
C. Substratum saline . . . . . 14. SEA-SHOAL FORMATION.

b. Plants floating freely; substratum unimportant.

A & B. In fresh water . . . . . 15. FRESH-WATER FORMATION.
C. In salt water . . . . . 16. PELAGIC FORMATION.

VI. Special Adaptations. *Biophytes*.

a Dependent upon human habitation 17. WASTE-LAND FORMATION.
b. Cultivated by man for his use or admiration
18. ECONOMIC FORMATION.
c. Saprophytic or parasitic on other organisms
19. FUNGOID FORMATION.

In the following lists given for the different formations the nomenclature of Gray's Manual, 6th edition, is mainly followed and also in general the same specific limits. Trees are starred (*) and shrubs marked thus (°), while the species characteristic of the different formations are *italicized.*

1. Sand-Barren Formation. *Xerophytes.*

Habitat: dry sand hills, drifting sands, and open sandy fields and plains, where the common species fail to maintain a foothold; flora well-marked but rather local, except in the Cape Cod region; species few and characteristic. Passes into (3) and (7).

Hudsonia tomentosa, Nutt.
H. ericoides, L.
° Arctostaphylos Uva-ursi, Spreng.
Lechea minor maritima, Gray.
° *Ilex glabra*, Gray.
Hypericum nudicaule, Walt.
Cyperus filiculmis, Vahl.
Chrysopsis falcata, Ell.
Cyperus Grayii, Torr.
Krigia Virginica, Willd.
Aralia hispida, Vent.
Aster linariifolius, L.
Lechea thymifolia, Michx.
° Myrica cerifera, L.
Spiranthes simplex, Gray.
° Smilax rotundifolia, L.
Corema Conradii, Torr.
Lechea tenuifolia, Michx.

2. Hilltop-Barren Formation. *Xerophytes.*

Habitat: high points of slate or granite exposed by denudation, or cliffs; very local; passing into (4).

° *Quercus prinoides*, Willd.
° *Q. ilicifolia*, Wang.
* Juniperus Virginiana, L.
° *J. communis alpina*, Gaud.
° * Prunus Pennsylvanica, L. f.
° P. cuneata, Raf.
° Arctostaphylos Uva-ursi, Spreng.
° Rhus typhina, L.
* Pinus rigida, Mill.
Silene Pennsylvanica, Michx.
Viola pedata, L.
V. ovata, Nutt.
Aralia hispida, Vent.
Lechea tenuifolia, Michx.
Cardamine parviflora, L.
Polygonum tenue, Michx.
Aster linariifolius, L.
Aristida dichotoma, Michx.
Corydalis glauca, Pursh.
Krigia Virginica, Willd.
Houstonia purpurea longifolia, Gray.
° *Vaccinium Pennsylvanicum*, Lam.
Ranunculus fascicularis, Muhl.
Lespedeza capitata, Michx.
Andropogon scoparius, Michx.
Selaginella rupestris, Spring.
* ° Prunus Virginiana, L.

More frequent on the cliffs:

Saxifraga Virginiensis, Michx.
Aquilegia Canadensis, L.
° Rhus Toxicodendron, L.
Woodsia ilvensis, R. Br.
Asplenium Trichomanes, L.
Polypodium vulgare, L.

3. Sand-Plain Forest Formation. *Mesophytes.*

Habitat: Sand or sandstone substratum, nearly level and covered with an open forest growth, which affords suitable conditions of shade and humidity and moderate accumulation of humus; passing into (1) in more exposed situations, into (5) or (8) in low ground and into (7) along the coast. Species relatively few and vegetation often scattered.

* Quercus alba, L.
* *Pinus rigida*, Mill.
* Carya alba, Nutt.
* Quercus coccinea tinctoria, Gray.
° Gaylussacia resinosa, T. & G.
° Vaccinium vacillans, Soland.
° Rhus copallina, L.
° Myrica asplenifolia, Endl.
Apocynum androsæmifolium, L.
Cypripedium acaule, Ait.
Epigæa repens, L.
Linaria Canadensis, Dumort.
Asclepias obtusifolia, Michx.
Gaultheria procumbens, L.
Crotalaria sagittalis, L.
Solidago odora, Ait.
° Ceanothus Americanus, L.
Cyperus filiculmis, Vahl.
Danthonia spicata, Beauv.
Spiranthes gracilis, Bigel.
Hieracium venosum, L.
Lupinus perennis, L.
Helianthemum Canadense, Michx.
Baptisia tinctoria, R. Br.
Viola pedata, L.
Polygala polygama, Walt.
Lespedeza capitata, Michx.
Deschampsia flexuosa, Trin.
Oenothera pumila, L.
Festuca tenella, Willd.
Sericocarpus conyzoides, Nees.
* Betula populifolia, Ait.
Tephrosia Virginiana, Pers.
Prenanthes serpentaria, Pursh.

4. Hilly Upland-Forest Formation. *Mesophytes.*

Habitat: Argillaceous soil with slate or granite base, often glacial drift; rough hilly woodlands including most of the region, with a rich and diversified flora, but apparently with few species characteristic; passing in exposed situations into (2) and in low ground into (6), (8), (9) or (11), but is often contiguous to and may pass into nearly all the other formations; often denominated "dry hillsides," "rocky slopes," "rocky open woods," etc. This is the dominant formation of the region.

* Quercus alba, L.
Q. coccinea tinctoria, Gray.
* Q. rubra, L.
* Carya alba, L.
* *C. porcina*, Nutt.
* Prunus serotina, Ehrh.
* Sassafras officinale Nees.
* Populus tremuloides, Michx.
Viola ovata, Nutt.
Hedeoma pulegioides, Pers.
Gerardia tenuifolia, Vahl.
G. quercifolia, Pursh.
G. flava, L.
Lobelia inflata, L.
Solidago nemoralis, Ait.
S. bicolor, L.

* *Ostrya Virginica*, Willd.
* *Castanea sativa Americana*, Gray.
* *Fagus ferruginea*, Ait.
* *Tsuga Canadensis*, Carr.
° Rhus typhina, L.
° R. glabra, L.
° Rubus Canadensis, L.
° R. occidentalis, L.
° Corylus Americana, Walt.
° C. rostrata, Ait.
° Vaccinium vacillans Soland.
° Myrica asplenifolia, Endl.
Lysimachia quadrifolia, L.
Melampyrum Americanum, Michx.
Solidago Canadensis, L.
S. rugosa, Mill.
Aster undulatus, L.
Geum album, Gmelin.
Lespedeza polystachya, Michx.
Geranium maculatum, L.
Anemone nemorosa, L.
A. Virginica, L.
Hieracium scabrum, Michx.
Carex Pennsylvanica, Lam.
Desmodium paniculatum, DC.
Polygala paucifolia, Willd.
Baptisia tinctoria, R. Br.
Bidens frondosa, L.

5. Sand-pond Margin Formation. *Hygrophytes.*

Habitat: wet open sandy places, about ponds and along streams; passing into (3) above and into (12) below. Very local and species few but characteristic; mainly in the Plymouth and Cape Cod regions.

Coreopsis rosea, Nutt.
Drosera filiformis, Raf.
D. intermedia Americana, DC.
Viola lanceolata, L.
Rhexia Virginica, L.
Utricularia resupinata, B. D. Greene.
U. cornuta, Michx.
Hypericum Canadense, L.
Polygala sanguinea, L.
Lobelia Dortmanna, L.
Juncus pelocarpus, E. Meyer.
J. dichotomus, Ell.
Cyperus dentatus, Torr.
Psilocarya scirpoides, Torr.
Eleocharis melanocarpa, Torr.
Hemicarpha subsquarrosa, Nees.
Eleocharis tuberculosa, R. Br.
Panicum virgatum, L.
P. verrucosum, Muhl.
Solidago tenuifolia, Pursh.
Stachys hyssopifolia, Michx.
Cyperus aristatus, Rottb.
Bartonia tenella, Muhl.
Ranunculus Cymbalaria, Pursh.
Myriophyllum tenellum, Bigel.
Cyperus flavescens, L.
Eriocaulon septangulare, With.
Eleocharis olivacea, Torr.
Juncus Greenei, Oakes & Tuckerm.
Fimbristylis autumnalis, R. & S.

6. Low-Meadow Formation. *Hygrophytes.*

Habitat: wet open places with argillaceous soil; often denominated "low open places," "swamp and stream margins," "about springs," "wet meadows," "muddy pond margins," "brooksides," "river-banks," "wet thickets," &c; passes normally into (4) above and into (9), (11) or (13) below. Flora abundant and characteristic.

° Cornus sericea, L'Her.
° *Pyrus arbutifolia*, L. f.
° Rubus hispidus, L.
° *Spiræa salicifolia*, L.
° S. tomentosa, L.
° Vaccinium corymbosum, L.
° Salix discolor, Muhl.
° S. rostrata, Rich. & other spp.
° Viburnum dentatum, L.
° Ilex verticillata, Gray.
Spiranthes cernua, Rich.
Lysimachia stricta, Ait.
Steironema ciliatum, Raf.
Saxifraga Pennsylvanica, L.
Eupatorium perfoliatum, L.
Glyceria Canadensis, Trin.
Hypericum ellipticum, Hook.
Scirpus atrovirens, Muhl.
Carex crinita, Lam. & other spp.
Eleocharis ovata, R. Br.
E. acicularis, R. Br.
Ranunculus septentrionalis, Poir.
Solidago lanceolata, L.
Phragmites communis, Trin.
Lycopus Virginicus, L.
L. sinuatus, L.
Epilobium coloratum, Muhl.
Polygonum acre, HBK.
P. Hydropiper, L.
Arenaria lateriflora, L.
Gerardia purpurea paupercula, Gray.
Houstonia cærulea, L.
Eupatorium purpureum, L.
Hypericum mutilum, L.
Viola blanda, Willd.
V. lanceolata, L
Iris versicolor, L.
Elodes campanulata, Pursh.
Mimulus ringens, L.
Cyperus strigosus, L.
Lobelia spicata, Lam.
Juncus effusus, L.
Aspidium Thelypteris, Swartz.
A. Noveboracense, Swartz.
Aster paniculatus, Lam.
Bidens connata, Muhl.
B. cernua, L.
Asclepias incarnata pulchra, Pers.
Cardamine Pennsylvanica, Muhl.

7. Sea-shore Formation. *Halohygrophytes.*

Habitat: sandy sea-beaches and high-tide flats, or sandy sea-shore immediately adjacent; soil more or less saline, passes into (3) above and (14) below. Flora sparse; species few and characteristic.

Cakile Americana, Nutt.
**Prunus maritima*, Wang.
Euphorbia polygonifolia, L.
Chenopodium rubrum, L.
Atriplex arenarium, Nutt.
Glaux maritima, L.
Arenaria peploides, L.
Triodia purpurea, Hack.
Statice Limonium Caroliniana, Gray.
Artemisia Stelleriana, Bess.
A. caudata, Michx.
Salsola Kali, L.
Xanthium Canadense echinatum, Gray.
Ammophila arundinacea, Host.
Lathyrus maritimus, Bigel.
Polygonella articulata, Meisn.
Solidago sempervirens, L.
Buda maritima, Dumort.
Salicornia ambigua, Michx.

8. Low-Woodland Formation. *Hygrophytes.*

Habitat: low alluvial woodlands; soil moist with deep shade and much humus; substratum unimportant; passes from (3) or (4) above into any lowland or aquatic formation; often spoken of as "low

woods," "moist shady places," "deep forests," "rich woods" and like terms. These moist cool woods have a very characteristic vege tation.

* *Acer rubrum*, L.
* A. saccharinum, Wang.
* Tilia Americana, L.
* *Platanus occidentalis*, L.
* Ulmus Americana, L.
* *Pinus Strobus*, L.
* Quercus coccinea, Wang.
* Fraxinus Americana, L.
° Amelanchier Canadensis oblongifolia, Torr. & Gray.
° Alnus incana, Willd.
° A. serrulata, Willd.
° Ampelopsis quinquefolia, Michx.
° Rhus Toxicodendron, L.
Arisaema triphyllum, Torr.
Maianthemum Canadense, Desf.
Circaea Lutetiana, L.
C. alpina, L.
Boehmeria cylindrica, Willd.
Aralia nudicaulis, L.
Viola pubescens, Ait.
V. blanda, Willd.
Sanguinaria Canadensis, L.
Trillium cernuum, L.
Oakesia sessilifolia, Wats.
Erythronium Americanum, Ker.
Impatiens fulva, Nutt.
Pilea pumila, Gray.
Allium Canadense, Kalm.
Ranunculus abortivus, L.
Geranium maculatum, L.
G. Robertianum, L.
Osmunda cinnamomea, L.
Asplenium Filix-foemina, Bernh.
Medeola Virginica, L.
Cornus Canadensis, L.
Viola cucullata, Ait.
Actaea alba, Bigel.
Solidago latifolia, L.
S. ulmifolia, Muhl.
S. serotina, Ait.
Veratrum viride, Ait.
Prenanthes alba, L.

9a. Swamp Formation. *Helophytes.*

Habitat: open swamps and marshes; soil more or less submersed; water shallow, often drying up in summer; plants amphibious or partly emersed; similar conditions in margins of ponds and shallow streams.

Sagittaria variabilis, Engelm.
S. heterophylla, Pursh.
° Alnus incana, Willd.
° A. serrulata, Willd.
° Rosa lucida, Ehrh.
° Myrica Gale, L.
° Rhus venenata, DC.
° Cephalanthus occidentalis, L.
Ludwigia palustris, L.
Proserpinaca palustris, L.
Cicuta maculata, L.
C. bulbifera, L.
Acorus Calamus, L.
Sium cicutaefolium, Gmelin.
Alisma Plantago, L.
Pontederia cordata, L.
Lathyrus palustris, L.
Equisetum limosum, L.
Decodon verticillatus, Ell.
Veronica scutellata, L.
Cardamine Pennsylvanica, Muhl.
Caltha palustris, L.
Sparganium eurycarpum, Engelm.
Iris versicolor, L.
Typha latifolia, L.
Carex stricta, Lam.
Sparganium simplex, Huds.
Peltandra undulata, Raf.
Zizania aquatica, L.
Glyceria fluitans, R. Br.
Rumex Brittanica, L.
Bidens chrysanthemoides, Michx.

9b. Bog Formation. *Helophytes.*

Habitat: similar to the preceding but characterized by the abundance of Sphagnum species, which form a close mat over the surface and maintain more equable conditions of temperature and moisture and thus permit the southern extension of many northern species. Flora very distinct from the preceding, with many Ericaceous shrubs.

° Vaccinium macrocarpon, Ait.
° V. Oxycoccus, L.
° Cassandra caliculata, Don.
° *Andromeda polifolia*, L.
° *Kalmia glauca*, Ait.
° *Ledum latifolium*, Ait.
° *Rhododendron Rhodora*, Don.
Sarracenia purpurea, L.
Chiogenes serpyllifolia, Salisb.
Smilacina trifolia, Desf.
Rhynchospora alba, Vahl.
Epilobium lineare, Muhl.
Menyanthes trifoliata, L.
Sphagnum spp.
Eriophorum gracile, Koch.
E. vaginatum, L.
Arethusa bulbosa, L.
Cladium mariscoides, Torr.
Drosera rotundifolia, L.
D. intermedia Americana, DC.
Utricularia cornuta, Michx.
Clintonia borealis, Raf.
Calla palustris, L.
Geum rivale, L.
Calopogon pulchellus, R. Br.
Pogonia ophioglossoides, Nutt.
Habenaria lacera, R. Br.

10. Salt-marsh Formation. *Halohelophytes.*

Habitat: mud flats covered by the sea at extreme tides and supporting a short but dense vegetation; frequent along the coast. Brackish meadows have a mixture of this flora and that of (9a). No shrubs.

Gerardia maritima, Raf.
Salicornia herbacea, L.
Suaeda linearis, Moq.
Juncus Gerardi, Loisel.
Spartina juncea, Willd.
S. stricta glabra, Gray.
Distichlis maritima, Raf.
Triglochin maritima, L.
Puccinellia maritima, Parl.
Atriplex patulum hastatum, Gray.
Iva frutescens, L.
Pluchea camphorata, DC.
Solidago sempervirens, L.
Carex maritima, O. F. Mueller.
Statice Limonium Caroliniana, Gray.
Aster subulatus, Michx.
Potentilla Anserina, L.
Scirpus maritimus, L.
Buda maritima, L.
Scirpus pungens, Vahl.
Iris prismatica, Pursh.
Typha angustifolia, L.
Aster tenuifolius, L.

11. Boggy-Woodland Formation. *Helophytes.*

Habitat: low wet woodlands, swampy or boggy with a dense Sphagnum growth; much humus and substratum unimportant.

Contains many northern species, possible here only in cool, shady, humid situations.

* *Larix Americana*, Michx.
* Pinus Strobus, L.
* Platanus occidentalis, L.
* Betula populifolia, Ait.
* *Chamaecyparis sphaeroidea*, Spach.
* Acer rubrum, L.
* Carpinus Caroliniana, Walt.
° Lindera Benzoin, Blume.
° Ilex verticillata, Gray.
° I. laevigata, Gray.
° Nemopanthes fascicularis, Raf.
° Rhus venenata, DC.
Symplocarpus foetidus, Salisb.
Veratrum viride, Ait.
Osmunda regalis, L.
Viola cucullata, Ait.
Equisetum sylvaticum, L.
Onoclea sensibilis, L.
Osmunda cinnamomea, L.
° Rhus Toxicodendron, L
Sphagnum spp.

12. Sand-Pond Formation. *Hydrophytes.*

Habitat: ponds and slow-flowing streams throughout the sand-plain region with sandy bottom and little humus; plants rooted and usually submersed or upper leaves floating.

Proserpinaca pectinacea, Lam.
Limnanthemum lacunosum, Griseb.
Hottonia inflata, Ell.
Nymphaea odorata, Ait.
Sagittaria teres, Wats.
Naias Indica gracillima, A. Br.
Orontium aquaticum, L.
Potamogeton Spirillus, Tuckerm.
Myriophyllum tenellum, Bigel.
M. ambiguum, Nutt.
Nuphar Kalmianum, Ait.
Lobelia Dortmanna, L.
Brasenia peltata, Pursh.
Eriocaulon septangulare, With.
Lycopodium inundatum Bigelovii, Tuck.

13. Mud Pond Formation. *Hydrophytes.*

Habitat: ponds and slow-flowing streams with bottom of clay or humus, often "mucky"; plants rooted and submersed or upper leaves floating, rarely emersed.

Nuphar advena, Ait.
Naias flexilis, R. & S.
Myriophyllum spicatum, L.
Nymphaea odorata, Ait.
Marsilia quadrifolia, L.
Chara fragilis, Desv.
Nitella flexilis, Ag.
Podostemon ceratophyllus, Michx.
Ranunculus aquatilis trichophyllus, Gray.
Callitriche heterophylla, Pursh.
Ranunculus multifidus, Pursh.
Potamogeton crispus, L.
P. natans, L. and other species.
Elodea Canadensis, Michx.
Vallisneria spiralis, L.

14. Sea-shoal Formation. *Halohydrophytes.*

Habitat: shallow water along the sea-shore or in salt-marsh pools. Marine plants mainly sea-weeds, fixed to rocks and soil, submersed.

Ruppia maritima, L.
Zostera marina, L.
Zannichellia palustris, L.
Potamogeton crispus, L.
Various marine algae, largely Fucaceae.

15. Fresh-water Formation. *Hydrophytes.*

Habitat: fresh-water ponds, streams and ditches; free-floating aquatics or submersed but unattached.

Utricularia vulgaris, L.
U. purpurea, Walt.
U. inflata, Walt.
Lemna minor, L.
L. trisulca, L.
Spirodela polyrhiza, Schleich.
Riccia fluitans, L.
R. natans, L.
Desmids, Diatoms and other algae.

16. Pelagic Formation. *Halohydrophytes.*

Habitat: deep sea. Plants free-floating in salt water.
Various marine algae.

17. Waste-Land Formation. *Biophytes.*

Habitat: yards, roadsides, waste places, cultivated fields, wherever the native vegetation has been weakened or destroyed by the activities of man and his domestic animals. Mainly introduced species;

Taraxicum officinale, Weber.
Capsella Bursa-pastoris, Moench.
Poa annua, L.
Plantago major, L.
P. lanceolata, L.
Chenopodium album, L.
Arctium Lappa, L.
Lepidium Virginicum, L.
L. ruderale, L.
Leontodon autumnalis, L.
Stellaria media, Cyrill.
Rumex crispus, L.
Ranunculus bulbosus, L.
R. acris, L.
Chrysanthemum Leucanthemum, L.
Cerastium vulgatum, L.
Amaranthus retroflexus, L.
Medicago Lupulina, L.
Cichorium Intybus, L.
Xanthium Canadense, Mill.
Hypericum perforatum, L.
Polygonum aviculare, L.

18. Economic Formation. *Biophytes.*

Habitat: cultivated fields, orchards and grounds. Species planted and cared for by man to supply his food, clothing, shelter or to be used for ornament or other purposes in his economic life.

The various cultivated plants.

19. Fungoid Formation. *Biophytes.*

Habitat: growing on living or dead organisms, from which they derive their sustenance. Parasites and saprophytes, mainly fungi.

Cuscuta Gronovii, Willd.
Monotropa uniflora, L.
M. Hypopitys, L.
Fungi various.
Epiphegus Virginiana, Bart
Aphyllon uniflorum, Gray.
Conopholis Americana, Wallr.

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RECENTLY RECOGNIZED SPECIES OF CRATAEGUS IN EASTERN CANADA AND NEW ENGLAND, — III.

C. S. Sargent.

§ Tenuifoliae.

Anthers rose color or purple.

* Stamens 5–10.

Crataegus tenella, Ashe, *Ann. Carnegie Mus.* i. 388, (May 1902).

I have referred provisionally to this eastern Pennsylvania and Delaware species a thin-leaved Thorn with 5–8 stamens, dark rose-colored anthers and oblong crimson fruit ripening early in September, which has been found in Connecticut by *C. B. Graves* at Waterford, and by *E. B. Harger* at Oxford where it is very abundant.

Crataegus fucosa, n. sp. Leaves ovate, acuminate, broadly concave cuneate to rounded at the entire base, finely doubly serrate, with incurved glandular teeth, and more or less deeply divided into numerous acuminate lateral lobes; when they unfold bright red and covered on the upper surface with short pale hairs, nearly fully grown, still

slightly villose and dark green tinged with red when the flowers open; at maturity thin, smooth, and dark yellow-green on the upper surface, paler on the lower surface, 3–5 cm. long, 2.5–3 cm. wide, with very slender yellow midribs and thin veins extending obliquely to the points of the lobes; petioles slender, often slightly wing-margined at the apex, obscurely grooved, 1.5–2 cm. long; stipules linear to lanceolate, bright red, often 1 cm. in length; on vigorous shoots leaves often pendant against the branch on stout winged glandular red petioles, more deeply lobed than the leaves of fertile branchlets, long-pointed, mostly truncate at the base, coarsely serrate, with straight teeth, 7–8 cm. long, 6–7 cm. wide, with stout bright rose colored midribs. Flowers 1.5 cm. in diameter on slender pedicels, in broad many-flowered thin-branched glabrous corymbs; bracts and bractlets linear to lanceolate, glabrous, bright rose color, large and conspicuous; calyx-tube broadly obconic, bright red before anthesis like the narrow elongated acuminate mostly entire gland-tipped lobes; stamens 5–10; anthers large, bright red; styles 3, surrounded at the base by a broad ring of pale tomentum. Fruit drooping on slender pedicels, in many-fruited clusters, oblong, full and round at the ends, scarlet, lustrous, marked by minute pale dots, 1.3–1.5 cm. in length, 9–12 mm. in diameter; calyx only slightly enlarged, with a small shallow cavity and reflexed lobes, entire or slightly and irregularly dentate towards the base, bright red on the upper side below the middle, mostly deciduous from the ripe fruit; flesh thin, yellow-green; nutlets 3, large for the size of the fruit, acute at the ends, prominently ridged on the broad back, with a high often grooved ridge, about 7 mm. long.

A shrub usually about 1 m. in height with nearly erect stems forming small thickets and covered with ashy gray bark, and stout zigzag branchlets dark dull red when they first appear, red-brown and very lustrous and marked by large pale lenticels during their first season, and ashy gray the following year, and armed with numerous very stout straight or slightly curved shining red-brown ultimately gray spines 3–4 cm. in length. Flowers about May 20th. Fruit ripens early in September and soon falls.

Massachusetts: Upland rocky pastures, Berlin, *J. G. Jack*, May 1900, West Boylston, *Mrs. J. E. Thayer* and *C. S. Sargent*, May and September 1901 and 1902. Common.

Easily distinguished in early spring by the bright red color of the young leaves, bud-scales and bracts, which make it conspicuous from a long distance, and in the autumn by the large drooping leaves with their bright rose colored midribs on the ends of the branches, and by the small very lustrous early ripening fruits.

Crataegus delucida, n. sp. — *Crataegus acutiloba*, Sargent, Rhodora, iii. 23 in part (1901).

Leaves ovate to broadly oval, acute, full and rounded or rarely cuneate, or on leading shoots truncate or slightly cordate at the mostly entire base, finely and often doubly serrate, with glandular teeth, and divided into 4 or 5 pairs of short acuminate spreading lateral lobes; covered above, early in the season, with short pale hairs; at maturity membranaceous, glabrous, very smooth and light yellow on the upper surface, pale on the lower surface, 3.5–4.5 cm. long, 3–4 cm. wide, or on leading shoots sometimes 6 cm. long and wide, with slender yellow midribs and very thin primary veins arching to the points of the lobes; petioles slender, nearly terete, 2–2.5 cm. long. Flowers about 1.2 cm. in diameter on slender elongated pedicels, in compound usually 7–12-flowered glabrous thin-branched compact corymbs; calyx-tube broadly obconic, the lobes gradually narrowed from broad bases, long, slender, acuminate, entire or occasionally furnished with a few minute glandular teeth; stamens 5–10; anthers large, light red; styles 3 or 4. Fruit in drooping clusters, oblong, full and rounded at the ends, bright scarlet, very lustrous, about 1.2 cm. in length; calyx small, sessile, with a narrow deep cavity and spreading closely appressed lobes, mostly deciduous from the ripe fruit; flesh thick, succulent, light yellow; nutlets 3 or 4, full and rounded at the ends ridged on the broad back, with a wide rounded ridge, 9 mm. long.

A treelike shrub 3 or 4 m. in height with slender stems covered with ashy gray bark, small ascending branches and thin nearly straight branchlets, dark green tinged with red when they first appear, light orange-red, lustrous and marked by numerous large white lenticels during their first season, becoming light gray-brown the following year and armed with numerous stout curved dark red-brown shining spines 3.5–4.5 cm. in length. Flowers from the 20th to the 25th of May. Fruit ripens late in September or early in October.

Vermont: Low slopes of Bald Mountain in Clarendon and Salisbury, *W. W. Eggleston*, September 1899, May and September 1901; *C. S. Sargent*, June and September 1900. Common, often forming small thickets, and in the autumn very conspicuous from the abundance of its large bright colored fruits.

Crataegus demissa, n. sp. Leaves ovate to deltoid, acute, broadly cuneate to truncate at the base, sharply doubly serrate, with straight teeth tipped with large bright red glands, and slightly divided into numerous short acute lateral lobes; when the flowers open nearly fully grown, membranaceous, dark green and coated above with short silky white hairs; at maturity thin glabrous, 3–3.5 cm. long, 2.5–3 cm. wide, with slender midribs and primary veins

extending obliquely to the points of the lobes; on vigorous shoots mostly deltoid and truncate or cordate at the base, deeply lobed, 4–6 cm. long; petioles slender, nearly terete, glandular, with minute dark glands 1–1.2 cm. long. Flowers 9 or 10 mm. in diameter on short slender pedicels, in compact 5–10-flowered glabrous corymbs; bracts and bractlets linear, entire, bright red, caducous; calyx-tube narrowly obconic, glabrous, the lobes gradually narrowed from the base, elongated, acuminate, entire, tipped with dark red glands, reflexed after anthesis; stamens 5–10; anthers small, dark rose color; styles 3 or 4, usually 3, surrounded at the base by a broad ring of pale tomentum. Fruit in few-fruited drooping clusters, short-oblong to subglobose or slightly obovate, scarlet, lustrous, 8 or 9 mm. long and nearly as broad; calyx sessile, with a broad shallow cavity and closely appressed lobes bright red on the upper side below the middle; flesh very thin, yellow, dry and mealy; nutlets 3 or rarely 4, unusually large for the size of the fruit, obtuse at the ends, prominently ridged on the broad back, with a high wide ridge, about 7 mm. long.

A slender shrub generally not more than 1 m. in height with small erect stems and slender nearly straight branchlets marked by occasional large dark lenticels, green tinged with red when they first appear, becoming bright red-brown and lustrous during their first season and gray-brown the following year, and armed with numerous stout or slender slightly curved bright red-brown shining ultimately ashy gray spines 3–5 cm. long. Flowers during the last week of May. Fruit ripens late in August or early in September and soon falls.

Massachusetts: Meadows near the Stockbridge Bowl, Lenox, *C. S. Sargent*, August 1885, *Brainerd* and *Sargent*, May 30, 1902. Vermont: Meadows, Charlotte, *C. S. Sargent*, September 7, 1900, *F. H. Horsford*, May 1902.

Well distinguished by the deltoid deeply lobed usually heart-shaped leaves on vigorous shoots, the small flowers and small nearly globose early-ripening fruit.

Crataegus glaucophylla, n. sp. Leaves broadly ovate, acute or short-pointed at the apex, rounded or broadly cuneate at the base, sharply and often doubly serrate above, with straight or incurved glandular teeth, and divided into 4 or 5 pairs of narrow acute or long-pointed lateral lobes; more or less tinged with red and roughened above by short pale caducous hairs when they unfold, more than half grown when the flowers open and then smooth light yellow-green and covered with a glaucous bloom above, pale and glaucous below, at maturity thin but firm in texture, light yellow-green on the upper surface, pale bluish green on the lower surface, about 6 cm. long and 4.5 cm. wide, or on vigorous shoots 7–8 cm. long and 6

cm. wide, with thin yellow midribs deeply impressed above and slender veins extending to the points of the lobes; petioles slender, slightly wing-margined at the apex, glandular, 2–2.5 cm. in length. Flowers small, on short slender pedicels, in long slender-branched glabrous usually 8–10-flowered compound corymbs; bracts and bractlets linear, minute, glandular, caducous; calyx narrowly obconic, green tinged with red, the lobes slender, elongated, acuminate, entire or occasionally glandular-serrate near the middle, reflexed after anthesis; stamens usually 10 or 5–10; anthers small, dark rose color; styles 3 or 4. Fruit on short thickened pedicels in drooping few-fruited clusters, short-oblong or rarely ovate, full and rounded at the ends, bright scarlet, very lustrous, marked by few large dots, 1.2–1.4 cm. long, about 1 cm. wide; calyx small, closely appressed, with a deep narrow cavity and lobes gradually narrowed from broad bases, acuminate, often slightly glandular-serrate; flesh thick, juicy, yellow, of a pleasant flavor; nutlets 3 or 4, thin, acute at the ends, prominently ridged on the back, with a broad sometimes slightly grooved ridge, about 8 mm. long.

A broad round-topped shrub 2–3 m. in height with numerous thick stems, covered with ashy gray bark, and stout zigzag branchlets marked by pale lenticels, yellow-green when they first appear, bright red-brown and lustrous during their first season, becoming dull light red-brown the following year, and armed with many slender red-brown shining straight or slightly grooved spines 2–7 cm. in length. Flowers during last week of May. Fruit ripens early in September but does not fall until the middle of October.

Massachusetts: Meadows near the Stockbridge Bowl, Lenox, *C. S. Sargent*, August 17, 1885; *Brainerd* and *Sargent*, May 30, 1902; *C. S. Sargent*, September 8, 1902; by the road from Great Barrington to Alvord, *Brainerd* and *Sargent*, May 31, 1902; Great Barrington, *C. S. Sargent*, September 8, 1902. New York: incomplete specimens collected by *C. H. Peck* at Sand Lake, Rensselaer County, and at Westport during the season of 1902 appear to belong to this species.

Crataegus ascendens, n. sp. *Crataegus acutiloba*, Sargent, Rhodora, iii. 23, in part.

Leaves oblong-ovate, acuminate, full and rounded or cuneate at the glandular base, finely and occasionally doubly serrate, with straight or incurved gland-tipped teeth, and slightly divided into 4 or 5 pairs of short broad acuminate lateral lobes; tinged with red as they unfold and covered above early in the season with short white appressed hairs; more than half grown when the flowers open, and at maturity thin but firm in texture, glabrous, dark yellow-green on

the upper surface, pale on the lower surface, 5.5–8.5 cm. long, 4.5–6 cm. wide, with slender yellow midribs and very thin primary veins extending to the points of the lobes; petioles slender, glandular with minute scattered dark mostly early deciduous glands, 2–3 cm. in length; stipules linear, acuminate, glandular-serrate, caducous. Flowers 1.4–1.5 cm. in diameter on slender pedicels, in broad compact many-flowered compound thin-branched glabrous corymbs; bracts and bractlets oblong-obovate, acute, finely glandular-serrate, caducous; calyx-tube narrowly obconic, the lobes slender, elongated, entire or sparingly and minutely glandular-serrate, reflexed after anthesis; stamens 10; anthers pink; styles 3 or 4. Fruit in broad drooping many-fruited clusters, oblong-obovate until late in the season, becoming oblong and full and rounded when fully ripe, dark crimson, lustrous, 1.3–1.4 cm. long, about 1.2 cm. wide; calyx small, sessile, with a deep shallow cavity and spreading lobes; flesh thick, yellow, soft and succulent; nutlets 3 or 4, thin, full and rounded at the ends, ridged on the narrow back, with a low round ridge, 9 mm. long.

A shrub 2–3 m. in height with numerous slender stems spreading into small thickets or rarely arborescent, ascending branches, and thin nearly straight branchlets dark olive green when they first appear, dark dull red-brown and marked by oblong pale lenticels during their first season, becoming light reddish brown the following year, and armed with few stout curved bright chestnut-brown spines 1.5–3 cm. in length. Flowers at the end of May. Fruit ripens the middle of October.

Vermont: Low mountain slopes and hillsides at the western base of the Green Mountains up to elevations of 500 feet above the sea-level only in loamy or gravelly soil, Bristol, *C. G. Pringle*, September 1879; New Haven, May, July, September and October, 1900, Middlebury, October 13, 1900, *Ezra Brainerd*; West Rutland, *W. W. Eggleston*, May 1900.

Crataegus Randiana, n. sp. Leaves ovate to broadly oval, acute or acuminate, cuneate or rounded at the base, finely and above the middle mostly doubly serrate, with straight or incurved gland-tipped teeth, and slightly divided into short acute or acuminate spreading narrow lobes; nearly fully grown when the flowers open and then light yellow-green and covered above with short appressed white hairs and glabrous below; at maturity membranaceous, glabrous, yellow-green, 5–6 cm. long, 4.5–5 cm. wide, or on leading shoots 7.5 cm. long and broad, with very slender yellow midribs slightly impressed on the upper side and thin primary veins extending obliquely to the points of the lobes; petioles slender, nearly terete, sparingly glandular, with minute dark glands, 2–4 cm. long.

Flowers about 1.5 cm. in diameter on elongated slender pedicels, in lax thin-branched glabrous 7–12-flowered compound corymbs; calyx-tube narrowly obconic, the lobes gradually narrowed from broad bases, acuminate, entire or occasionally slightly serrate, tipped with bright red glands, reflexed after anthesis; stamens usually 5, occasionally 7; anthers large, dark rose color; styles 3 or 4. Fruit drooping on slender pedicels, oblong, full and rounded at the ends, scarlet, lustrous, marked by occasional pale dots, 1–1.2 cm. long, 8–9 mm. wide; calyx small, sessile, with a narrow shallow cavity and erect incurved lobes mostly deciduous from the ripe fruit; flesh thin, dry and mealy; nutlets 3 or 4, broad, rounded at the ends, prominently ridged on the back, with a wide rounded ridge, 6 mm. long.

A shrub 3–4 m. in height with numerous stout stems covered with ashy gray bark, erect branches forming an open irregular head, and slender nearly straight branchlets marked by small pale lenticels, dull green and tinged with red when they first appear, bright red-brown and lustrous during their first season, becoming pale gray-brown the following year, and armed with very slender straight bright red-brown shining ultimately ashy gray spines 3.5–4 cm. in length. Flowers from the 5th to the 10th of June. Fruit ripens from the middle to the end of September.

Maine: Low moist meadows near Bar Harbor, Mt. Desert Island, *C. S. Sargent*, September 4, 1899; *Miss Beatrix Jones*, September 20, 1899, June and September 1901.

The name of Edward L. Rand, one of the authors of the *Flora of Mt. Desert Island* and the secretary of the New England Botanical Club, may be appropriately connected with this handsome and distinct plant.

Crataegus crudelis, n. sp. Leaves ovate, acute, broadly cuneate or rarely rounded at the usually entire base, finely and often doubly serrate, with glandular straight or incurved teeth, and deeply divided into numerous narrow acute spreading or reflexed lobes; when they unfold villose above and along the midribs and viens below, about half-grown when the flowers open and then membranaceous, light yellow-green and covered above with short, appressed, lustrous white hairs and nearly glabrous below; at maturity thin, dark yellow-green and scabrate on the upper surface, pale on the lower surface, 6–7 cm. long, 5–6 cm. wide, with thin midribs slightly impressed above and 5 or 6 pairs of slender primary veins arching obliquely to the points of the lobes; petioles nearly terete, slightly winged at the apex, glandular with numerous small dark persistent glands, 2–3 cm. long; stipules linear, glandular, caducous. Flowers 2 cm. in diame-

ter on long slender slightly villose pedicels, in broad compound many-flowered thin-branched hairy corymbs; bracts and bractlets linear, small, caducous; calyx-tube broadly obconic, villose at the base, glabrous above, the lobes linear, acuminate, sparingly glandular-serrate, mostly only above the middle, villose on the inner surface, reflexed after anthesis; stamens 10; anthers pink; styles 3–5, surrounded at the base by a broad ring of pale tomentum. Fruit on stout glabrous or slightly hairy pedicels, in broad drooping many-fruited clusters, oblong, full and rounded at the ends, crimson, lustrous, marked by large pale dots, 1–1.2 cm. long, 9–10 cm. wide; calyx sessile, with a broad deep cavity and much elongated lobes gradually narrowed from broad bases, villose and dark red on the upper side toward the base; flesh thin, juicy, greenish white; nutlets 3–5, full and rounded at the ends, conspicuously ridge on the broad back, with a high narrow ridge, about 7 mm. long.

A shrub with numerous ascending stems 5–7 m. in height, and stout slightly zigzag branchlets marked by many large pale lenticels, dark yellow-green when they first appear, light red-brown and lustrous during their first season, gray tinged with red the following year, and armed with many stout straight or slightly curved bright red-brown lustrous ultimately ashy gray spines, on some individuals about 4 cm. long and on others from 8–10 cm. in length, and often furnished near the middle with a short lateral branch. Flowers at the end of May or early in June. Fruit ripens at the end of September.

Province of Quebec: Valley of the St. Lawrence River near the City of Quebec; Montmorency Falls, August 1895; Montmorency Falls, Levis, and Isle of Orleans, September 1900; Montmorency Falls and Levis, May and September 1901, *J. G. Jack*.

This species resembles *Crataegus acutiloba*, Sargent (Rhodora, iii. 23), in the shape of its deeply lobed leaves, but differs from that species in its much larger flowers, in its villose corymbs and large fruits, and in the great size of the spines on some individuals, the largest of these being larger than those of any other species of this group which I have seen. *Crataegus acutiloba*, based on specimens gathered on Mt. Desert Island and at other points on the coast of Maine will, in view of the collections made during the last two years in the St. Lawrence valley, and western New England, be found probably to be confined to the coast region north of Massachusetts Bay.

Crataegus matura, Sargent, Rhodora, iii. 24 (1901). This early-ripening species was first seen by Mr. Ezra Brainerd and myself near Middlebury, Vermont, in August and September 1900, and the

early ripening of the fruit noticed. When it was described flowers of the Middlebury plant had not been collected but flowering specimens of a species with twenty stamens which had been collected by Mr. A. W. Edson at Burlington, Vermont, were thought to belong to this species and on these specimens so much of the description as relates to the flowers was based. Flowers collected the following year by Mr. Brainerd from the plant which had furnished the fruiting specimens on which *Crataegus matura* was in part established show the error of the previous determination and the importance of drawing the descriptions of Crataegus only from flowering and fruiting specimens taken from the same individual. The description of the flowering specimens from Middlebury is as follows:

Leaves more than half grown when the flowers open, membranaceous dark yellow-green and roughened above by short appressed white hairs, pale and glabrous below; stipules oblong-obovate and acuminate to lanceolate, coarsely glandular-serrate, often 1.3–5 cm. in length, caducous. Flowers about 1.6 cm. in diameter on slender pedicels, in broad many-flowered thin-branched glabrous compound corymbs; bracts and bractlets oblong-obovate to linear, acuminate, very coarsely glandular-serrate, large, conspicuous, turning red before falling, caducous; calyx-tube broadly obconic, the lobes gradually narrowed, slender, elongated, acuminate, bright red and glandular at the apex, entire or furnished with occasional minute teeth, reflexed after anthesis; stamens 5–10, usually 5–7; anthers red; styles 3–5, usually 3 surrounded at the base by a broad ring of pale tomentum.

Crataegus florea, n. sp. Leaves ovate, acute or acuminate, rounded or broadly cuneate at the base, sharply and often doubly glandular-serrate, and slightly divided into 4 or 5 pairs of short acute lobes; nearly fully grown and slightly roughened above by short white hairs when the flowers open; at maturity thin but firm in texture, dark yellow-green and scabrate on the upper surface, paler and glabrous on the lower surface, 5.5–6 cm. long, 4–5 cm. wide, with slender yellow midribs and 5 or 6 pairs of thin primary veins arching to the points of the lobes; petioles slender, narrowly wing-margined at the apex, slightly grooved, sparingly glandular, with mostly deciduous glands, 2.5–3 cm. long; on vigorous shoots sometimes as broad as long, more deeply lobed, abruptly long-pointed. Flowers about 1.5 cm. in diameter on long slender pedicels, in numerous crowded many-flowered compound corymbs; bracts and bractlets linear, glandular, small, caducous; calyx-tube narrowly obconic, the lobes gradually narrowed from broad bases, slender, acuminate, entire or occasionally undulate or obscurely serrate, reflexed after anthesis; stamens 6–10; anthers red; styles 3 or 4, surrounded at the base by a thin ring of pale tomentum. Fruit oblong, full and rounded at the

ends, scarlet, lustrous, 1.3–1.5 cm. long; calyx sessile, with a broad shallow cavity and elongated spreading lobes often deciduous from the ripe fruit; flesh thin, yellow; nutlets 3 or 4, thin acute at the ends, ridged on the back, with a high rounded ridge, 8 mm. long.

An arborescent shrub sometimes 4 m. in height or often a broad low bush, with stout nearly straight branchlets marked by small pale lenticels, dull red-brown when they first appear, rather light reddish brown and lustrous during their first season, dull and darker the following year and ultimately ashy gray, and armed with very stout slightly curved red-brown shining spines 2.5–4 cm. in length. Flowers at the end of May. Fruit ripens late in September.

Maine: valley of the middle Penobscot River, borders of streams and woods, Orono, *M. L. Fernald*, May and September, 1901.

Crataegus monstrata, n. sp. Glabrous with the exception of the short hairs on the upper side of the young leaves. Leaves ovate to oval, acuminate, cuneate at the entire base, sharply serrate above, with straight glandular teeth, and divided into 4 or 5 pairs of narrow acuminate lateral lobes; about half grown, light yellow-green and scabrate above and glabrous below when the flowers open, at maturity membranaceous, scabrate and yellow-green on the upper surface, pale on the lower surface, 5–6 cm. long, 3.5–4 cm. wide, with very slender nearly terete petioles 2.5–3 cm. in length; on leading shoots leaves ovate, full and rounded at the broad base, often 6 cm. long and wide, with stout petioles slightly wing-margined above the middle and often conspicuously glandular. Flowers on elongated slender pedicels, in broad many-flowered thin-branched compound corymbs; bracts and bractlets linear, small, glandular, turning red in fading, caducous; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, slender, acuminate, entire or rarely obscurely serrate, tipped with small red glands, reflexed after anthesis; stamens 5–7; anthers light violet color; styles usually 3. Fruit in few-fruited drooping clusters, oblong, full and rounded at the ends, bright scarlet marked by many minute pale dots, about 4 cm. long and 9 or 10 mm. wide; calyx small, sessile, with a broad shallow cavity, closely appressed entire or slightly serrate lobes; flesh thin, yellow, somewhat juicy; nutlets 3, rounded at the ends, thin, prominently ridged on the back, with a broad slightly grooved ridge, 7 mm. long.

Usually shrubby, but occasionally arborescent in habit and 3 m. in height, with ascending branches and slender slightly zigzag branchlets, light orange-green when they first appear, dull red-brown and marked by occasional small pale lenticels during their first season, and light reddish brown or ashy gray the following year, and armed with many slender slightly curved red-brown ultimately gray spines

3–5 cm. in length. Flowers during the last week in May. Fruit ripens about the middle of September.

CONNECTICUT: northern part of the valley of Eight Mile Brook, Southbury and Middlebury, *E. B. Harger*, May and September, 1901. Very abundant. "Most of the trees were so white with blossoms that they were noticeable from a distance of from one quarter to one half of a mile." (E. B. Harger *in litt.*)

Crataegus blandita, n. sp. *Crataegus pastorum*, Sargent, RHODORA, iii. 76, in part (1901).

Leaves broadly ovate, acute, truncate, rounded or rarely cuneate or on leading shoots mostly subcordate at the base, sharply sometimes doubly serrate, with glandular teeth, slightly divided into 3 or 4 pairs of broad short-pointed lateral lobes; tinged with red and covered with short pale hairs when they unfold, more than half-grown when the flowers open and then dark green and roughened on the upper surface with short lustrous white hairs and pale and glabrous on the lower surface; at maturity thin but firm in texture, smooth, dark yellow-green above, light yellow-green below, about 5 cm. long and 4 cm. wide, or on vigorous shoots often 6 cm. long and wide, with slender yellow midribs slightly impressed above and 3–5, usually 4, pairs of thin primary veins arching obliquely to the points of the lobes; petioles slender, nearly terete, glandular, with small dark red deciduous glands, frequently rose-color in the autumn, 2–3.5 cm. long; stipules linear, acuminate, often lobed at the base on vigorous shoots, glandular with bright red glands, caducous. Flowers 1.2–1.3 cm. in diameter on long slender pedicels, in thin-branched glabrous mostly 10-flowered compound corymbs with 3- or 4-flowered peduncles from the axils of the upper and occasionally also of the second leaf; bracts and bractlets linear, acuminate, glandular, small, caducous; calyx-tube narrowly obconic, the lobes slender, elongated, acuminate, finely and irregularly glandular-serrate, villose on the inner surface, reflexed after anthesis; stamens 5–10, usually 10; anthers purple; styles 3 or 4, surrounded at the base by a narrow ring of pale tomentum. Fruit in drooping many-fruited clusters, oblong, full and rounded at the ends, 1.2–1.5 cm. long, 8 or 9 mm. wide, scarlet, lustrous, marked by many small pale lenticels; calyx small, sessile, with a narrow deep cavity, and lobes villose above, spreading and reflexed, often deciduous from the ripe fruit; flesh thin, yellow; nutlets 3 or 4, acute at the ends, ridged on the back, with a broad rounded ridge, about 8 mm. long.

A shrub 2–4 m. in height with numerous erect stems spreading into small thickets, and stout zigzag branchlets marked by large pale lenticels, dark dull orange-green tinged with red when they first appear dull reddish or orange-brown during their first season, light

reddish brown the following year, later becoming lustrous and gray tinged with red, and armed with many very stout curved light red-brown spines 2.5–4.5 cm. in length. Flowers at the end of May. Fruit ripens late in September or early in October.

Province of Quebec: Rocky limestone ridges, Caughnawaga Indian Reservation [Adirondack Junction]; Montreal Island, [Montreal West]; Ile Perrot, Longueil, *J. G. Jack*, August and September 1899, May 1900, May and September 1900, 1902.

Specimens of this species were referred by me two years ago to *Crataegus pastorum*, Sargent, a species which is probably confined to central and southern Massachusetts. From this species *Crataegus blandita* differs in its more deeply lobed yellow not blue-green leaves, in its larger flowers, in fewer-flowered corymbs, and its larger darker-colored fruit.

Crataegus genialis, n. sp. *Crataegus pastorum*, Sargent, Rhodora, iii. 24 (1901) in so much as relates to Berkshire County, Massachusetts, and the Champlain Valley of Vermont.

Leaves oval, acute or acuminate, rounded or cuneate or often oblique at the entire base, finely and usually doubly serrate above, with straight or incurved glandular teeth, and mostly slightly divided above the middle into 1–4 pairs of short acute lobes; slightly tinged with red or light bronze color and roughened above by short pale hair when they unfold, nearly fully grown, membranaceous, dark green and scabrate above when the flowers open; at maturity thin but firm in texture, smooth and very dark green on the upper surface, pale blue-green on the lower surface, mostly pendant, 5–7 cm. long, 5.5–6 cm. wide, with slender yellow midribs and primary veins running obliquely to the points of the lobes; petioles very slender, nearly terete, 2–3 cm. long; stipules linear, acuminate, glandular-serrate, caducous; on vigorous shoots leaves often 6–7 cm. long and broad and rounded or acuminate at the apex, coarsely serrate, their lateral lobes sometimes broad and rounded, coriaceous, very dark green, with stout rose-color midribs and thick dark red petioles generally wing-margined to below the middle, not more than 1 cm. in length and about as long as the broad foliaceous lunate stipules. Flowers 1.3–1.5 cm. in diameter on slender elongated pedicels, in broad many-flowered compound glabrous corymbs; bracts and bractlets linear, glandular, red before falling, caducous; calyx-tube narrowly obconic, the lobes slender, acuminate, entire or occasionally sparingly dentate, reflexed after anthesis; stamens 5–10; anthers small, rose color or purple; styles 3. Fruit on long slender pedicels in drooping many-fruited clusters, oblong, full and rounded at the ends, yellow-green when fully grown, becoming at maturity dark crimson, and lustrous, marked by numerous small pale dots, 1.1–1.2 cm. long, 8–9 mm. wide;

calyx somewhat enlarged, closely appressed, with a broad shallow cavity and slender lobes gradually narrowed from broad bases, acuminate, mostly entire, bright red on the upper side near the base; flesh thin, greenish yellow; nutlets 3, acute at the ends, prominently ridged on the narrow back, with a high ridge, about 6 mm. long.

A shrub 3 or 4 m. in height with slender stems covered with pale gray bark, ascending branches forming an open head, and stout very zigzag branchlets marked by large pale lenticels, yellow-green more or less tinged with red when they first appear, bright red-brown and lustrous during their first season, gray-brown the following year, and armed with many stout mostly curved bright red-brown shining ultimately gray spines 1.8–3.5 cm. in length. Flowers during the last week of May. Fruit ripens early in October, often remaining on the branches after the leaves have fallen.

Massachusetts: Meadows near the Stockbridge Bowl, *Brainerd* and *Sargent*, May 30, 1902, *C. S. Sargent*, September 9, and October 3, 1902; roadside, North Adams to Williamstown, *Brainerd* and *Sargent*, May 29, 1902, *C. S. Sargent*, September 1902. Vermont: New Haven and North Ashburnham, October 1899, New Haven, August 1900, Salisbury Plain and Middlebury, September 1900, along the New Haven River, August and October 1900, *E. Brainerd*; Middlebury, *C. S. Sargent*, September 1900; Putney, *W. W. Eggleston*, October 1902; Bellows Falls, *J. G. Jack*, September 1901, (with earlier ripening fruit).

Crataegus dissimilis, n. sp. Leaves acuminate, full and rounded or broadly cuneate at the entire more or less oblique base, finely often doubly glandular-serrate above, and slightly divided into 3 or 4 pairs of small acute or acuminate lateral lobes; more than half grown, dark green and scabrate above and pale below when the flowers open; at maturity thin but firm in texture, glabrous, dark yellow-green and smooth on the upper surface, light yellow-green on the lower surface, 4–5 cm. long, 3–5 cm. wide, with thin yellow midribs and slender primary veins extending very obliquely to the points of the lobes; petioles slender, nearly terete, 1.5–3. cm. in length; on vigorous shoots leaves sometimes 6–7 cm. long and wide, usually slightly cordate at the base and more deeply lobed than the leaves of lateral branchlets, with stout petioles 1–1.2 cm. in length. Flowers 1.1–1.2 cm. in diameter when fully expanded, on slender pedicels, in loose thin-branched glabrous compound corymbs, the axillary peduncles elongated, sometimes 3–5 flowered, and rising above the terminal central part of the inflorescence; calyx tube narrowly obconic, tinged with red, the lobes slender, acuminate and long-pointed, entire or finely glandular-serrate below the middle, tipped with bright red

glands, reflexed after anthesis; stamens usually 10, rarely 8 or 9; anthers deep rose-purple; styles 3–5. Fruit in few-fruited erect clusters, short-oblong to obovate, in the early autumn dull red and slightly pruinose, when fully ripe, dark red, lustrous, destitute of bloom, 1.2–1.4 cm. long, about 1.2 cm. wide; calyx sessile, with a broad shallow cavity and spreading or reflexed lobes often deciduous from the ripe fruit; flesh thin, juicy, acidulous reddish orange color; nutlets usually 3 or 4, thick, acute at the ends, rounded and prominently ridged on the broad back, with a high rounded ridge, about 8 mm. long.

A shrub 3 or 4 m. in height with stems not more than 8 cm. in diameter, covered with light gray bark scaly near their base, spreading branches and slender nearly straight branchlets marked by numerous oblong pale lenticels, dull reddish brown and pruinose when they first appear, soon becoming bright red-brown and lustrous, and dark gray-brown or ashy gray in their second season, and armed with stout straight or slightly curved bright chestnut-brown and shining ultimately gray spines 4–5 cm. in length. Flowers about the 20th of May. Fruit ripens and begins to fall from the 1st to the middle of October.

Connecticut: Open rocky pastures near the Niantic River, East Lyme, *C. B. Graves*, May and September 1902.

This species appears to be well distinguished by the unusual development of the lower branches of the inflorescence, by the character of the leaves which are thicker and more rigid than is usual in species of this group, and by the short-oblong or short-obovate fruit with red-tinted flesh.

Crataegus media, n. sp. Glandular with the exception of the caducous hairs of the young leaves. Leaves ovate to rhombic, acute, broadly cuneate or rounded at the entire base, coarsely often doubly serrate above, with straight glandular teeth, and slightly divided into 3 or 4 pairs of short acuminate lateral lobes, bright red and covered above with short lustrous white caducous hairs when they unfold, about half-grown, membranaceous, light yellow green and almost glabrous when the flowers open; at maturity subcoriaceous, dark dull blue green on the upper surface, pale blue-green on the lower surface, 4–6 cm. long, about 4 cm. wide, with thin light yellow midribs and usually 4 pairs of thin primary veins extending to the points of the lobes; petioles slender, wing-margined at the apex, slightly grooved, glandular above the middle early in the season, often tinged with red in the autumn, 1.5 to 3 cm. long; stipules linear to oblong, acuminate, coarsely glandular-serrate, turning red before falling, caducous; on vigorous shoots leaves usually

full and rounded at the broad base, coarsely serrate, more deeply lobed than the leaves on lateral branchlets, often 7–8 cm. long and nearly as wide. Flowers 1.3–1.4 cm. in diameter on slender pedicels, in small usually 5 or 6-flowered thin-branched compact corymbs; bracts and bractlets linear, acute, glandular-serrate, caducous; calyx-tube broadly obconic, the lobes slender, acuminate, entire or rarely sparingly serrate above the middle, tipped with minute red glands, reflexed after anthesis; stamens 5–8; anthers light rose color; styles 3–5, surrounded at the base by a broad ring of pale tomentum. Fruit in few-fruited drooping clusters, obovate, full and rounded at the apex, gradually narrowed from above the middle to the slender base, bright scarlet, 1.4–1.8 cm. long, 1–1.4 cm. wide; calyx enlarged, sessile with a broad shallow cavity and reflexed closely appressed lobes often slightly dentate toward the apex, bright red on the upper side at the base, mostly persistent; flesh thick, sweet, nearly white, dry and mealy; nutlets 3–5, thick or thin according to their number, acute at the ends, rounded and prominently ridged on the back, with a high rounded ridge, about 8 mm. long.

An arborescent shrub 3–4 m. in height with erect branches and slender slightly zigzag branchlets, light yellow-green when they first appear, dull dark red-brown and marked by occasional large oblong pale lenticels during their first season, orange color and rather lustrous the following year, and armed with numerous slender slightly curved dark purple shining spines 4–6 cm. in length. Flowers during the last week of May. Fruit ripens early in October.

Connecticut: Borders of swamps in low moist soil, Oxford, *E. B. Harger*, May and August 1901, October 1902; *C. S. Sargent*, September 1902.

This interesting species with its small flowers in few-flowered corymbs, small number of stamens, leaves at first hairy on the upper surface but dark green and subcoriaceous at maturity, and pear-shaped fruits without bloom or a calyx-tube, appears intermediate between the *Tenuifolia* and *Pruinosa* sections of the genus and might be referred with equal propriety to either.

* * Stamens usually 20.

Crataegus Forbesae, n. sp. Leaves ovate to oval, acuminate, gradually narrowed and rounded or broadly concave-cuneate at the mostly entire base, serrate, often doubly with small straight or incurved glandular teeth, and slightly divided into 3 or 4 pairs of short acute lateral lobes; tinged with red when they unfold and coated above until after the flowers open with short soft pale hairs, at maturity dull dark bluish green and glabrous on the upper surface, paler on

the lower surface, 4–5 cm. long, 3.5–4.5 cm. wide, with slender yellow midribs deeply impressed above and very thin primary veins extending obliquely to the points of the lobes; petioles slender, slightly grooved, often wing-margined at the apex by the decurrent bases of the leaf-blades, 1.5–2.5 cm. long; stipules linear, acuminate, glandular, caducous; on leading shoots leaves sometimes 5–6. cm. long and nearly as wide as long, more deeply lobed than the leaves of fertile branchlets, their petioles stout, wing-margined to below the middle, conspicuously glandular, often rose color. Flowers 1.8–2 cm. in diameter on long slender pedicels, in broad thin-branched many-flowered compound glabrous corymbs; bracts and bractlets linear to oblong-obovate, glandular, caducous; calyx-tube broadly obconic, the lobes gradually narrowed from broad bases, acuminate, entire or rarely sparingly serrate near the middle, glandular and reddish at the apex; stamens 20, rarely 15–18; anthers large, dark rose color; styles 4 or 5, surrounded at the base by a broad ring of pale tomentum. Fruit in many-fruited erect or drooping clusters, subglobose to short-oblong, full and rounded at the ends, scarlet, lustrous, marked by numerous large pale dots, 1–1.2 cm. in diameter; calyx prominent, sessile, with a broad deep cavity and nearly entire appressed lobes, dark red on the upper side near the base and generally persistent on the ripe fruit; flesh thin, juicy, pale yellow; nutlets 4 or 5, usually 5, thin, acute at the ends, slightly or prominently ridged on the back, about 7 mm. long.

A broad round-topped shrub 3–5 m. in height, sometimes beginning to flower when less than 1 m. tall, with numerous stout stems covered with smooth gray bark, and slender branchlets marked by many small pale lenticels, dull red-brown when they first appear, bright red-brown and lustrous during their first season, dull gray-brown the following year, and ultimately ashy gray and armed with stout slightly curved often blunt spines 2–4 cm. in length. Flowers about May 20. Fruit ripens from the 10th to the middle of September and soon falls.

Massachusetts: Open rocky pastures in moist soil, Clinton, Stirling, West Boylston, *Evelyn Forbes Thayer*, May and September 1901 and 1902. Connecticut: In a hedge on Harris Court, New London, *C. E. Graves*, May and September 1902, *C. S. Sargent*, August 1902.

The maiden name or Mrs. John E. Thayer, an industrious collector and student of Crataegus growing in her native County of Worcester, Massachusetts, may properly be associated with this handsome plant, one of several undescribed forms which she has helped to make known.

Crataegus Alnorum, n. sp. Leaves acute or acuminate, sharply and usually doubly glandular-serrate or simply crenately serrate at the broad rounded or cuneate base, and divided into four or five pairs of small acuminate spreading lobes; coated with short lustrous white hairs when they unfold, nearly fully grown when the flowers open and then membranaceous, light yellow-green and still covered with hairs above and glabrous below; at maturity thin but firm, glabrous, dark bluish green on the upper surface, pale blue-green on the lower surface, 4.5–5.5 cm. long, 3.5–4.5 cm. wide, with slender yellow midribs slightly impressed above and thin primary veins arching to the points of the lobes; petioles slender, nearly terete, slightly wing-margined at the apex, glandular with small dark red deciduous glands, 1.5–3 cm. in length. Flowers 1.7 cm. in diameter on slender pedicels in broad thin-branched glabrous many-flowered compound corymbs; bracts and bractlets linear, glandular, small, mostly fallen before the flowers open; calyx-tube broadly obconic, the lobes abruptly narrowed from wide bases, slender, acuminate, entire or finely serrate, with occasional small gland-tipped teeth; styles 3–5, surrounded at the base by a narrow ring of pale tomentum. Fruit in gracefully drooping few or many-fruited clusters, oblong-obovate, bright scarlet, lustrous, about 1.2 cm. long and 8 mm. wide; calyx sessile, with a broad shallow cavity and reflexed appressed lobes often deciduous from the ripe fruit; flesh thin, yellow, dry and mealy, nutlets 3–5, thin, acute at the narrow ends, prominently ridged on the back, with a high grooved ridge, about 7 mm. long.

A slender arborescent shrub 3–5 m. in height with ascending branches and slender nearly straight or slightly zigzag branchlets marked by occasional oblong pale lenticels, dark yellow-green more or less tinged with red when they first appear, bright red-brown during their first season, becoming light or dark gray-brown in their second year, and only slightly armed with stout straight or somewhat curved bright red-brown ultimately ashy gray spines 2.5–3 cm. long. Flowers at the very end of May or in early June. Fruit ripens toward the end of September.

Maine: Valley of the middle Penobscot River in low sandy soil mixed with or bordering Alder thickets, Orono, *M. L. Fernald*, May and September 1901. The most common species in the region often covering acres of ground with many hundreds of plants.

Arnold Arboretum.

Ajuga genevensis in New England. — In the last edition of Gray's Manual and in Britton and Brown's Illustrated Flora only one species of Ajuga is given and that is introduced, growing in New England and the Middle States, *A. reptans*, L. Dr. Britton's later Flora, however, states in the appendix that *A. genevensis*, L., has become established at a station in Pennsylvania. This is similar to *A. reptans*, L., but differs from that species in its larger flowers, stouter habit, more pubescent stem and leaves, and in its lack of runners.

A. reptans is established near Saco, Maine, about New York City, and is reported from various other stations. A recent investigation shows that some reports of stations for this species are erroneous and that the plant is *A. genevensis* instead. Many of the reports of Ajuga are not based on herbarium specimens so it is at present impossible to say just how many should be credited to *A. reptans* and how many to *A. genevensis*.

I have seen specimens of the latter species from New York City, collected many years ago by Judge Brown (the station is now probably improved out of existence), from Danville, Pennsylvania (the station noted in Dr. Britton's Flora), from New Haven, Connecticut, where it seems to be well established, and from Southington, Connecticut, where it is established at two stations. This is the plant listed in the recent Southington Flora as *A. reptans*, L. We certainly have both species of Ajuga established here in New England and the writer would be very glad to get specimens of either from any station so that we may find their exact distribution. — C. H. Bissell, Southington, Connecticut.

Red-flowered Anemone riparia. — *Anemone riparia*, the tall graceful Anemone of calcareous northern river-banks, was originally described [1] as having large white sepals, rarely varying to greenish white. Recently, however, Mr. George H. Richards has brought to the Gray Herbarium, with *Dryas Drummondii*, *Anemone multifida*, and other unusual plants collected by him on the banks of Grand River, Gaspé County, Quebec, a specimen of *Anemone riparia* with deep red sepals. This extreme color-variation, although previously

[1] Rhodora, i, 51, t. 3 (1899).

unknown in *A. riparia* and its immediate allies, is not unprecedented in the subgenus *Euanemone*. Our common Wood Anemone, *A. quinquefolia*, varies from white to crimson-tinged, and the northern *A. multifida*, ordinarily with red flowers, is not rare with white or even greenish sepals.

It is interesting in this connection to note that Mr. Richards collected on Grand River flowers of *Anemone multifida* having as many as fourteen sepals. — M. L. Fernald.

VIOLA ARVENSIS IN NEW ENGLAND.

B. L. Robinson.

The success with which the little pale-flowered pansy of the Alleghany region has been shown to be a distinct American species instead of the *V. arvensis*, Murr. (or as many authors prefer *V. tricolor*, var. *arvensis*) of the Old World has led students of our violets to the over hasty conclusion that all our violets of this type from Maine to Georgia are of the same endemic species and are to be classed as *V. Rafinesquii*, Greene (*V. tenella*, Muhl., not Poir.). It is, however, a fact familiar to many New England observers that the little yellowish white flowered pansy, locally abundant from southern New England to Newfoundland, instead of appearing endemic, has the habits of an introduced plant. It is seldom if ever found far from dwellings and is chiefly seen in old fields, about dumping places, etc., almost always in soil which has been artificially loosened.

Some months ago Dr. E. H. Eames called my attention to the fact that this violet of New England of which he had observed specimens near Bridgeport, Connecticut, was not the plant of the South and West, now classed as *V. Rafinesquii*. A careful examination of material sent by Dr. Eames and specimens from other sources fully confirms his view.

V. Rafinesquii is a slender delicate plant with peculiar many-parted and palmately cleft stipules of roundish contour. The petals are of a pale blue or lavender tinge shading at the base into yellow, and they are nearly or quite twice as long as the very short sepals. This species is frequent from Eastern New York to Kansas and southward.

The plant of New England, however, is decidedly stouter. The stipules are also deeply cleft but the divisions are less numerous and more pinnate in their arrangement. The flowers are larger, and the petals, which are pale yellow (the upper sometimes with a faint tinge of lavender), scarcely if at all exceed the relatively large sepals. An examination of specimens and plates of the Old World material of related forms convinces me that this is just the plant figured as *V. arvensis*, Murr., in the English Botany, t. 2712, in the Flora Danica, t. 1748, and Reichenbach's Icones Florae Germanicae, t. 4517, figures which are accepted as representative of *V. arvensis*, Murr., by such critical students of Viola as Messrs. Rouy and Foucaud in their exhaustive subdivision of the violets of France.[1]

This violet, in America at least, shows no tendency to intergrade with *V. tricolor*, L., nor with *V. Rafinesquii*, Greene.

To date I have seen specimens of *V. arvensis* from the following American localities. Newfoundland: on rocky bare slopes of hills immediately back of habitations in the poorer suburbs of St. John's, *Robinson & von Schrenk*, no. 190. Maine: in an old field, Orono, *Fernald*; in a rich field, North Berwick, *Parlin*, no. 654. Massachusetts: abundant in an old field, Cambridge, *Fernald*; Medford Street, Somerville, *C. E. Perkins*; Northampton, *Mrs. E. H. Terry*, Connecticut: sandy wastes along the beach, Black Rock, Bridgeport, *Eames*; in a garden (without cultivation), Southington, *Bissell*. New York: Oak Point, *Buchheister*.

Gray Herbarium.

[1] Fl. de France, iii. 1 to 58.

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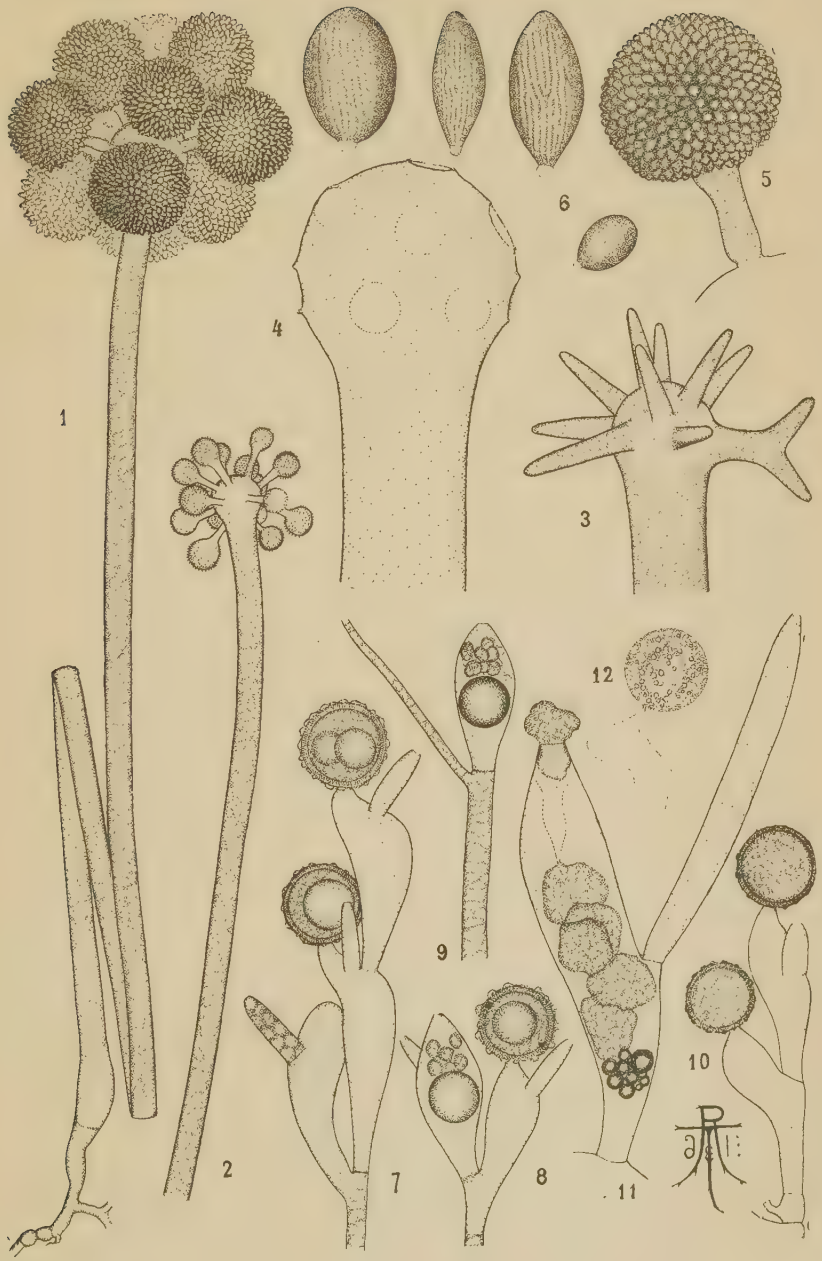

R. Thaxter del.

CHOANEPHORA, MONOBLEPHARIS.

Why Not Spend the Summer in the Maine Woods?

EVERY BOTANIST enjoys bracing air and picturesque country, and if with these he can combine the pleasure of discovery his summer is a happy one. No region in the Eastern United States affords the real botanist such opportunity for the pursuit of his studies in the field as the northern two-thirds of Maine. For there he will find twenty thousand (20,000) square miles of forest rarely interrupted save by the innumerable glistening lakes, interlacing rivers and wild waterfalls, and the rough alpine peaks of unexplored mountains. Thoreau's description nearly sixty years ago of a bit of this great forest to the west of Katahdin might well have been written but yesterday:

"There it was, the State of Maine, which we had seen on the map, but not much like that, — immeasurable forest for the sun to shine on, that eastern *stuff* we hear of in Massachusetts. No clearing, no house. It did not look as if a solitary traveller had cut so much as a walking-stick there. Countless lakes, — Moosehead in the southwest, forty miles long by ten wide, like a gleaming silver platter at the end of the table; Chesuncook, eighteen long by three wide, without an island; Millinocket, on the south, with its hundred islands; and a hundred others without a name; and mountains also, whose names, for the most part, are known only to the Indians. The forest looked like a firm grass sward, and the effect of these lakes in its midst has been well compared, by one who has since visited the same spot, to that of a 'mirror broken into a thousand fragments, and wildly scattered over the grass, reflecting the full blaze of the sun.'"

This is the immense forest-park which we invite you to explore. Here you may find a quiet retreat by pleasant waters, in the shelter of giant cliffs; or if a lean-to or bark-hut are not to your liking you can "put up" at one of the log-camps or lodges already built and ready to give you royal welcome to the simple and wholesome life of the Maine woods. If, however, you prefer to cling a little closer to civilization, you will find comfortable quarters and accommodating hosts in the villages scattered here and there along the line of the BANGOR & AROOSTOOK as it makes its way northward across the wilderness. And even at the hotels you will not find yourself very far from the Maine woods, for a walk of a few minutes will bring you to the verge of the "immeasurable forest."

If you are a lover of northern plants you will have rare pleasure in a tramp across country from your temporary home. If you have been familiar with the rocky oak-woods of southern New England, nothing

can be more fascinating than the damp moss-carpeted evergreen forest, such as you will find occupying the low plains and the cool mountain slopes throughout Northern Maine. You can enter vast stretches of such forest on all sides of *Moosehead Lake* and throughout the *Katahdin Iron Works* region, and all along the main line of the railroad and its various northern branches. Here beneath the tall spruces are the rare plants for which at home you have made long and vain pilgrimages: — the tiny Mitre-wort, MITELLA NUDA, with its lace-like petals, the elusive Sweet-Coltsfoot, PETASITES PALMATA, one year blossoming in abundance, and then failing for years to show another of its fragrant heads, and the delicate Tway-blades, LISTERA AURICULATA, CONVALLARIOIDES, and CORDATA, rarely seen except by the botanist ready to creep in the moss. Here, too, you will make many new acquaintances: — the strange Spurred Gentian, HALENIA DEFLEXA, with its interesting bronze and greenish clustered flowers; the little white PYROLA MINOR for which you have hunted in the White Mountains, and nearby its handsome relative, P. ASARIFOLIA with glossy leaves and flesh-colored flowers. Then here are the Club-mosses, LYCOPODIUM COMPLANATUM, SABINAEFOLIUM, and SITCHENSE, species unknown to many save from herbarium-specimens.

In the region of *Fort Kent* and *Van Buren* these spruce woods shelter very many more species which it is worth while to see: — the largest of the Rattlesnake Plantains, GOODYERA MENZIESII, the rare Arctic Fleabane, ERIGERON ACRIS, the remarkable local Wood Betony, PEDICULARIS FURBISHIAE, unknown outside the St. John Valley.

Where the woods grow thin and the ankle-deep carpet of Hypnum changes to a knee-deep carpet of sphagnum, you will find yourself entering one of the Sphagnum-bogs which cover many thousand miles of Maine and New Brunswick. Here, for instance near *Sherman*, *Crystal* or *Island Falls* on the upper Mattawamkeag, or in hundreds of other similar areas to the west and north, in late May and early June the bog is a brilliant display of color: white foam-like masses of the spicy Labrador Tea, LEDUM GROENLANDICUM, rich rosy banks of the Pale Laurel, KALMIA GLAUCA, indefinite white waves of the Alpine Cotton-grass, ERIOPHORUM ALPINUM, brightened here and there with the deep yellows of Cypripediums. Later these bogs will repeat this show of colors in other fine displays: white in TOFIELDIA or in the Swamp Valerian, VALERIANA SYLVATICA, scattered among the Bog Birch, BETULA PUMILA, and the Swamp Honeysuckle, LONICERA OBLONGIFOLIA; rose in the splendid CYPRIPEDIUM SPECTABILE; and orange in the northern Squaw-weed, SENECIO ROBBINSII. But these showy plants are not alone the attractive features of the bogs, for search will reveal humbler and to the botanist more pleasing returns,— rare CARICES, C. TENUIFLORA, GYNOCRATES, and VAGINATA, or the little Sundew, DROSERA LINEARIS.

If instead of to the evergreen forest your path leads over an upland

ridge with its deciduous covering of sugar-maple, beech, and birch, you will again be in a happy hunting ground, for here, in the upland woods between *Houlton*, *Presque Isle*, and *Fort Fairfield*, is the home of DICENTRAS, CLAYTONIAS and DENTARIAS, of VIOLA SELKIRKII, the Seneca Snakeroot, POLYGALA SENEGA, the woodland orchids, HABENARIA HOOKERIANA, and H. BRACTEATA, and other species which brighten the woods of spring and early summer.

The dense woods, however, are not always the best botanizing grounds, and so, even in northern Maine, their charm is enhanced by the presence of a river. If you follow the ledgy and gravelly banks of one of these northern streams,—as the *St. John* between the *Little Black* and the *Aroostook Rivers*, or the Aroostook itself between *Masardis* and the splendid gorge as the river approaches the *St. John*—you will be always alert, for every turn is apt to bring you to some new discovery. It may be a bank pink with the long racemes of OXYTROPIS CAMPESTRIS, var. JOHANNENSIS, or the equally handsome HEDYSARUM BOREALE, the globular heads of Chives, ALLIUM SCHOENOPRASUM, or the dainty evanescent flowers of PRIMULA MISTASSINICA. On some steep cliff by a water-fall you will see the rosettes of the Aromatic fern, ASPIDIUM FRAGRANS, the daisy-like heads of ERIGERON HYSSOPIFOLIUS, the glistening leaves of SHEPHERDIA, or the pink flowers of the rare ANEMONE MULTIFIDA. On the sandy beach you will find great thickets of northern willows, SALIX GLAUCOPHYLLA, etc., and a brilliant display of ASTRAGALUS ALPINUS, TANACETUM HURONENSE, and PRENANTHES RACEMOSA, interspersed with the less showy EQUISETUM VARIEGATUM, TRIGLOCHIN PALUSTRIS, and JUNCUS ALPINUS, var. INSIGNIS. Higher up the bank, on the talus-slope, are the delicate little Gentian, GENTIANA AMARELLA, var. ACUTA, and the handsome White Painted-Cup, CASTILLEJA PALLIDA.

If you follow the rivers you must not become so absorbed in the shore vegetation as to forget the aquatic plants. This is a land of lakes and ponds; and these and the channels by which they are emptied are often carpeted by plants too little known to the average botanist:— MYRIOPHYLLUM FARWELLII and POTAMOGETON OBTUSIFOLIUS in the *Piscataquis* and *Mattawamkeag Rivers* and their crystal-clear tributaries; and MYRIOPHYLLUM ALTERNIFLORUM and JUNCUS SUBTILIS in the *Mattawamkeag*, *Aroostook* and *St. John*.

The mountains of northern Maine, after all, are among the most fascinating regions for botanizing. If you have once lived on *Katahdin* you can never forget the wild grandeur of its Great Basin and the sheer cliffs and splendid Tableland. In exploring this most impressive of eastern mountains, one finds himself walking over broad carpets of the Alpine Bearberry, ARCTOSTAPHYLOS ALPINA, loaded with deep black berries, the depressed RHODODENDRON LAPPONICUM, gorgeous with rosy-purple flowers, the handsome BRYANTHUS TAXIFOLIUS, and the delicate pink-

flowered CASSIOPE and the close-matted Alpine Azalea, LOISELEURIA. Then it is most thrilling to find in their alpine homes the other plants unknown on the lowlands, as COMANDRA LIVIDA, parasitic on the roots of alpine blueberries and crowberries, CAREX SAXATILIS and KATAHDINENSIS about alpine tarns, and EPILOBIUM ANAGALLIDIFOLIUM and SAXIFRAGA STELLARIS, var. COMOSA, hiding under cold wet boulders and cliffs.

But the greatest charm of the Maine woods for botanists is not in the regions which are now explored and whose vegetation is known. The regions of special interest are the hundreds of mountains, lakes and streams upon which no botanist has yet ventured. There you can go with the spirit of true discoverers, for everything you observe will be of some importance to science. These fields for real investigation are on all sides. For instance, there is only a very incomplete record of the vegetation about *Moosehead Lake*, and only two of its mountains, *Kineo* and *Squaw* have been botanically explored. Only three other large lakes in northern Maine have been visited by botanists and those — *Mattawamkeag*, *Squawpan*, and *Portage* — very superficially examined. No botanist knows *Schoodic*, *Seboois*, *Millinocket*, *Pamedumcook*, *Lobster*, *Chesuncook*, *Chamberlain*, *Caucomgomoc*, *Chemquasabamticook*, *Froid*, *Eagle*, and the countless other splendid waters like a "mirror broken into a thousand fragments and wildly scattered over the grass." Nor does he know the slopes, commanding summits and abysses of the *Sourdnahunk Mts.*, *Traveller*, *Moosilauke*, *Baker*, the *Spencers*, and the hundreds of others "whose names are known only to the Indians."

The northwestern section of Maine is essentially virgin territory; and but one successful trip has been made on the upper *St. Francis*. Yet within a few miles of this Maine border there are many northern plants which may well be watched for within New England territory. The botanist whose good fortune takes him to the upper *St. Francis* may watch with hope for PLEUROGYNE CARINTHIACA, ERIOPHORUM RUSSEOLUM, ASTRAGALUS ELEGANS, PARNASSIA PALUSTRIS, SAXIFRAGA CAESPITOSA, ANEMONE PARVIFLORA, CORNUS SUECICA, PEDICULARIS PALUSTRIS, and many other arctic plants known closely to approach northern Maine.

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